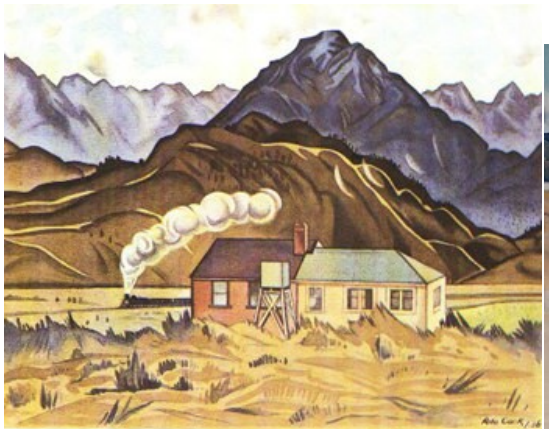
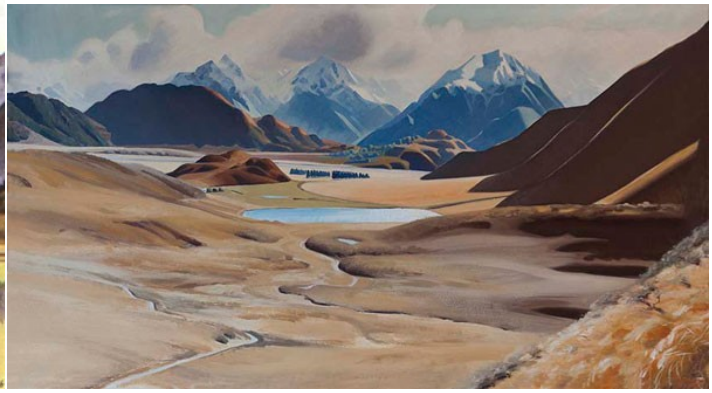
Snow and Ice Research Group, New Zealand

Annual Workshop
Cass Field Station, Canterbury
July 2nd-July 4th 2015

Announcement and Registration Form
May 6, 2015



Cass field station by Rita Angus



Cass basin by Alistair Austin Deans

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ROCKFALL AT FOX GLACIER: A HAZARD ANALYSIS USING STRUCTURE FROM MOTION AND SPATIAL MODELLING.

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As glaciers retreat, downwasting of the ice increases the instability of surrounding rock slopes. In addition, ice thinning can lead to surface morphology changes that can result in a progressively concave transverse profile. This short-term paraglacial process may lengthen the run-out distance of potential rockfalls. The Fox glacier is a temperate maritime glacier located on the western side of New Zealand's Southern Alps. Large annual precipitation and a relatively warm climate results in a high mass turnover, which makes Fox glacier extremely sensitive to climate. Current rapid retreat appears to be associated with an escalation of rockfall activity, particularly in the terminus region where walking-tracks are located. Glacier-related tourism is important to the local economy, so maintaining safe-access to the glacier is crucial from both an economic and hazard management perspectives. The area was therefore relevant to develop a rockfalls assessment using a physics-3D model (RockFall Analyst, Lan et al 2007) with a high resolution digital elevation model (DEM) acquired by Structure from Motion (SfM). Our analysis improves 2D-hazard profiles by spatial modelling rockfall trajectories and taking into account the local geology and mechanical properties of rock falling on the ice surface. Our simulations show that as the glacier thins, blocks travel further out onto the glacier. We identify potential rockfall run-out on hazard maps thus providing a first assessment tool for local guides for working in this dynamic environment. We suggest that future research should focus on the interaction between paraglacial processes, climate and rockfall occurrence to further understand the dynamics at seasonal scale. Worldwide, numerous alpine glaciers are retreating and exposed slopes become prone to natural hazards, thus resulting in the increase of the issues outlined here of management between risk and glacier tourism.